haemodilution. In conclusion, we agree with Moor and colleagues that systematic bedside use of TEG or ROTEM will induce a more rational use of blood products and guide in selection of effective coagulation factor concentrates. In particular, the fibrinogen-sensitive assays seem important to early recognize acquired fibrinogen deficiency.

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doi:10.1093/bja/aep070

Paradoxical air embolism from a central venous catheter

Editor—A 66-yr-old female, non-smoking patient without relevant comorbidities underwent an uneventful right nephrectomy for renal cell carcinoma. Before surgery, a triple-lumen 7 F catheter was placed in the right internal jugular vein for perioperative haemodynamic management. The following post-surgical period was unremarkable. On postoperative day 4 before removal, the caps of the central venous catheter were disconnected with the patient sitting in an upright position. Immediately after disconnection of the caps and removal of the catheter, the patient lost consciousness, then became cardiopulmonary unstable followed by cardiac arrest. Immediately after successful cardiopulmonary resuscitation, the initial ECG, which was performed upon arrival on the ICU, showed significant ST-segment elevation in leads II, III, aVF and depression in aVL, consistent with acute posterior myocardial infarction. A coronary angiogram was performed, but no evidence of coronary artery occlusion was found. Two hours after the initial cardiac arrest, the ST-segment had returned to normal. Analgosedation (propofol and fentanyl), which was initiated after cardiopulmonary resuscitation, was terminated. However, as the patient regained consciousness 3 h after removal of the central line, she had a complete left-sided hemiplegia. An emergency CT of the brain demonstrated no specific abnormality. Given the direct chronological coincidence, cerebral air embolism was suspected as the most likely reason for the focal neurological deficit. Treatment was symptomatic, including administration of oxygen 100% (because of air embolus), i.v. fluids, serum glucose <6.6 mmol litre^{-1}, systolic arterial pressure between 110 and 190 mm Hg, normocapnia, and early mobilization of the patient. In order to explore the route of air into the cerebral and coronary vasculature, a transoesophageal echocardiogram was performed. A large patent foramen ovale measuring 1.5×1 cm could be identified, suggestive of paradoxical air embolism. A bubble study demonstrated instant and massive pass from the right to left chambers (Fig. 1). Fortunately, recovery of the patient was remarkably fast; on re-examination 4 h later, motor strength of the left arm and leg had almost returned to normal, and cardiopulmonary situation remained unchanged. After an uneventful 3 days, the patient was discharged from the hospital without any neurological or cardiac residual symptoms.

Venous air emboli can paradoxically enter the arterial circulation through a patent foramen ovale and cause major harm.[1–3] Patent foramen ovale can be found in at least 25% of the general population.[4] The patent foramen ovale is usually functionally closed, unless the right atrial pressure exceeds the left atrial pressure, allowing right-to-left shunting. In the case reported, significant

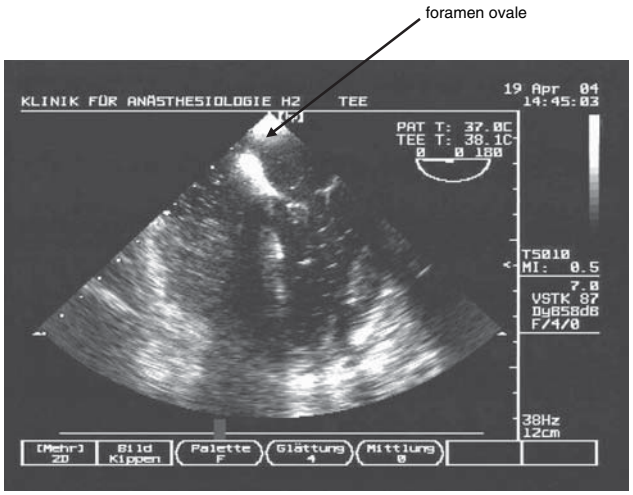

Fig 1 Transoesophageal echocardiogram (bubble study), patent foramen ovale.

right-to-left shunting was observed as most likely a significant amount of air passed from the right over to the left ventricle, presumably because left atrial pressure was low because of postoperative dehydration, systemic hypotension, and an upright position.

This case presents the need for awareness of this rare but potentially life-threatening complication. Furthermore, sudden neurological or cardiac events after manipulation of a central venous line should call attention to a possible paradoxical air embolus. No specific treatment is available, but administration of oxygen 100% and i.v. fluids seems prudent.[5] To prevent such events, any manipulation of central venous lines should be undertaken in the supine position while the spontaneous breathing patient is exhaling.[6] However, even with severe neurological and cardiac effects, outcome may not be fatal.

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doi:10.1093/bja/aep071

Intracoronary air embolism detected by transoesophageal echocardiography for aortic valve replacement

Editor—Intracoronary air embolism is a rare complication of open heart surgery which is characterized by the appearance of hypotension, ST elevation, and ventricular fibrillation after aortic clamping removal or in the last minutes of cardiopulmonary bypass (CPB).[1] Several authors have demonstrated the effectiveness of monitoring transoesophageal echocardiography (TOE) during cardiac surgery for diagnosis of intracoronary air embolism as it detects the presence of air in the coronary arteries and intraoperative myocardial ischaemia due to alterations in segmentary ventricular contractility.[2–4] We report a case of intracoronary air embolism detected by TOE in a patient undergoing aortic valve replacement for severe stenosis. Intraoperative TOE showed a marked depression in ventricular myocardial activity with severe hypokinesia and areas with hyper-refringency due to intracoronary air (Fig. 1).

A 43-yr-old, 91 kg man, with a history of hypertension and hypercholesterolemia who was treated with captopril, propranolol, and statins underwent general anaesthesia for valve replacement surgery for severe aortic stenosis secondary to bicuspid valve calcification. He had dyspnoea at rest for 8 weeks and episodes of upper retrosternal chest pain pressing in character. Transthoracic echocardiography

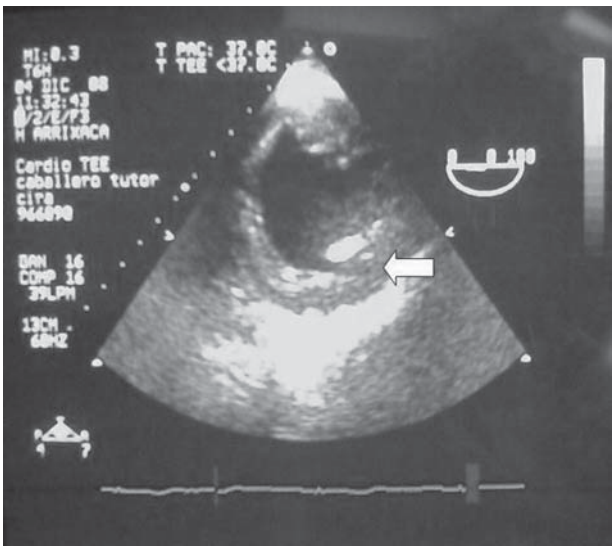

Fig 1 TOE: intracoronary air embolism with hyper-refringency areas in left ventricular anterior wall.